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Plasma-grown high-surface-coverage nanoislanded Ni Catalyst Films for Dense Nanotube Arrays AMANDA RIDER, KEVIN CHAN, IGOR LEVCHENKO, KOSTYA (KEN) OSTRIKOV, Plasma Nanoscience, The University of Sydney — Dense carbon nanotube (CNT) arrays are usually grown on surfaces covered with islanded films of Ni, Co or Fe catalyst particles. Adsorbed atoms diffusing about the substrate surface penetrate through the catalyst and form a CNT on the Ni surface. Thus, parameters of the catalyst particles (density and size, distribution function and spatial location) directly determine the characteristics of the final CNT forest. Processes such as self-assembly and island transformations can't be modeled without calculating the real adatom concentration field (ACF). Dissolution of an island can initiate abrupt rearrangement of the ACF resulting in a significant change in rate of growth of the neighboring islands. Displacement of island may lead to the same effect. Some successful attempts at modeling surface phenomena such as island shape transformation are known. In our work we model dissolution, displacement and coalescence of the islands. Our approach is based on direct calculation of the adatom concentration field on the surface. Our simulation results can be used to control and optimize the density, size and distribution of CNT nucleation sites, a critical but yet unresolved issue of nanofabrication [1].
[1] K. Ostrikov, IEEE Tran. Plasma Sci. 35, 127 (2007)

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